Sprinkler Head Matches Waterflow to Soil Needs

new sprinkler head may help growers apply precisely the right amount of water and farm chemicals to their crops. Increased precision should reduce or eliminate problems that might otherwise be caused by managing an entire field as if it were uniform throughout in slope, fertility, and crop growth.

The device, says Agricultural Research Service engineer Dennis C. Kincaid at Kimberly, Idaho, is designed to avoid over-irrigating, which wastes water and can cause leaching of fertilizer or other chemicals into underground water supplies.

Variable-flow sprinkler heads in a center pivot irrigation system, for example, would allow growers to apply the correct amount of water not only to sandy, shallow patches that drain readily, but also to heavy clay soils that hold water longer. Center pivot systems are moving sprinklers that pivot about one end, irrigating a circular field typically one-half mile across.

Kincaid and three Idaho-based colleagues invented the new sprinkler head. They are Bradley A. King and Gary L. Foster of the University of Idaho, Aberdeen, and Rodney B. Wood, who is with Precision Irrigation Systems, Inc., of Soda Springs, Idaho.

The sprinkler head would be ideal for growers who use new, precision-farming technologies such as global positioning systems to map and manage their farmland. When an irrigation system delivers fertilizer or other chemicals along with water—a technique known as chemigation—application rates can again be



Variable-flow irrigation sprinkler head improves the precision of water and farm chemical applications.

Below: Agricultural engineers Bradley King (left), of the University of Idaho, and Dennis Kincaid, with the ARS Northwest Irrigation and Soils Research Laboratory at Kimberly, attach a variable-flow sprinkler head to an irrigation system.

customized to take into account natural variations such as the fertility of different soil types.

Idaho tests with a prototype show that it can reduce flow to about 35 percent of a nozzle's full capacity, says King, who is an agricultural engineer. And the variable-flow sprinkler head may result in less wear and tear on irrigation systems than another option—pulsating devices that alternately turn the flow on and off. Unlike that mechanism, the variable-rate sprinkler head never completely shuts off the flow.

The amount of flow that's blocked is determined primarily by the diameter of a needle or pin that moves smoothly in and out of the nozzle. The flow is lessened when the needle is inserted. However, King points out, the spray pattern—the area covered by the spray—isn't significantly smaller, so it shouldn't leave plants thirsty.

The needle is controlled either by an electrical power source or a hydraulic actuator. Either energy source can, in turn, be activated by a computer. Because it may require fewer pressure regulators and less wiring and plumbing than some other systems, the variable-flow sprinkler head may prove to be a less expensive choice for some farms.

ARS and the University of Idaho are seeking a patent for the invention.—By Marcia Wood, ARS.

For more information on Patent Application No. 08/650, 295, "Variable Flow Sprinkler Head," contact Dennis C. Kincaid, USDA-ARS Northwest Irrigation and Soils Research Laboratory, 3793 North 3600 East, Kimberly, ID 83341; phone (208) 423-6503, fax (208) 423-6555, e-mail kincaid@kimberly.ars.pn.usbr.gov

